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ENERGY $AVER$

"... For Business and Industry".

VOLUME 1 / NUMBER 4

CONTAIN YOUR ENERGY COSTS BY INSTALLING A POOL COVER

The Facts ...

Installing a cover on your swimming pool can help prevent energy dollars from evaporating overnight.

In Alberta, swimming pools are one of the most expensive recreation facilities to operate because of the volume of water that evaporates from a pool's surface. A pool cover can lower your heating and ventilation costs by significantly reducing the energy losses associated with evaporation. It can also lower your water, sewer, chemical and, in some cases, electrical costs.

Public and semi-public pools in Alberta annually lose some 96 million gallons of water to evaporation. Heating this amount of "make-up" water costs Albertans, on average, $2.5 million per year, or about $3300 per pool. For indoor pools, heating large amounts of "make-up" air to control humidity costs an average of $1.7 million, or about $3100 per pool per year.

Because pool covers do not form a perfect seal, a small amount of evaporation still occurs. Pool cover suppliers suggest that covers can prevent, on average, 90 per cent of evaporative losses during the covered time.

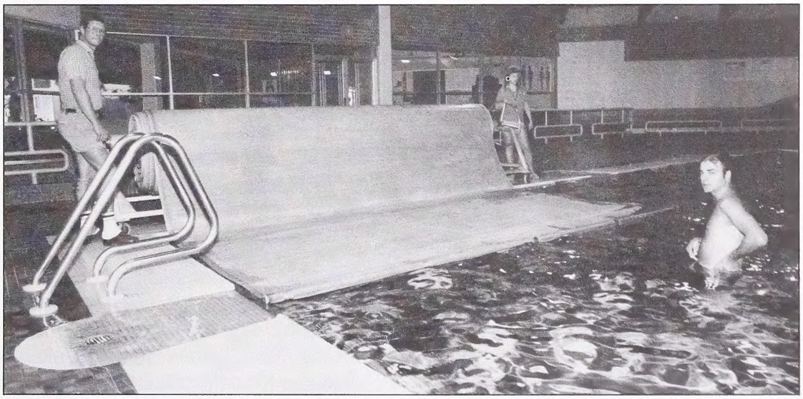
Covering the pool when unoccupied can reduce pool heating costs in almost direct proportion to the ratio of the time the pool is covered. Thus, covering a pool for 12 hours a day can reduce water heating costs by about 50 per cent. For indoor pools, annual ventilation costs can also be reduced by using a pool cover. Lowering the absolute humidity of indoor pool areas reduces the volume of cold outside air that must be heated, then exhausted, to control humidity. Savings are possible in the cost of heating large volumes of "make-up" air and in the electrical cost of continuously running the fan motor.

If an alternative source of space heating (such as perimeter heating) is available, ventilation systems can be switched off when the pool is covered (for additional heat loss savings). For buildings with only the ventilation system as the source of space heat, facility owners and managers should check to see if their systems are equipped with return air. These systems can be reset to 100 per cent recirculation during the period the pool is covered to reduce fresh air heating costs.

Choosing the right pool cover to meet the specific needs of a facility is an important point to consider. Factors such as convenience, economics, aesthetics and maintenance should be examined before making a purchase. Don Naffin, a consultant with the Community Recreation Facilities Section of Alberta Recreation and Parks, says, "The major factor to consider when selecting a pool cover is the ease of laying it out and retracting it."

The easiest way to install a cover on a pool is with a roller system. However, roller systems can be expensive, depending on the type. For smaller commercial and residential pools, rollers cost less than $400 while for larger commercial and municipal pools, they can cost up to $3000 for a 12- to 16-foot system.

For commercial facilities such as hotels, owners and managers should



The roller system and pool cover installed on the Camrose Aquatic Centre pool is saving the City of Camrose energy dollars.

consider how the pool will look with a cover and what its effect will be on the pool users. The cover should be carefully selected to enhance the pool area.

Pool cover prices vary considerably depending on the type of cover purchased. In Alberta, polyethylene and foam covers, and various bubble types, range in price from $0.30 to $1.00 per square foot ($3.00 to $11.00 per square metre).

Polysolar (raised bubble) pool covers are designed to absorb solar radiation as well as retard heat loss through evaporation. They are most effective on outdoor pools. This type of cover can raise the temperature of outdoor pools by 10° to 15°F (5° to 8°C) if left on during sunlight hours. Some of the insulating characteristic may be lost because of bubble breakage during prolonged use.

A newer design in bubble-type covers is known as LLDPE (linear low density polyethylene). Since the bubbles are flat, this cover provides more surface area, more air space and better insulation value than the round-bubble types. The flat bubble type is also more puncture resistant, and has twice the elongation and tensile strength of the conventional bubble type.

Polyethylene and foam covers are best suited for indoor pools, as they do not trap solar energy. Two types are available: foam coated on two sides with woven polyethylene (dual coat), or foam coated only on one side (open foam). Dual-coat covers are more durable and better at preventing algae growth than the open foam.

A suitable swimming pool cover can be a valuable and usually cost-effective device for saving on heating and ventilation bills, and water, sewer and chemical costs. Payback periods of less than two years on a pool cover investment are often possible.

The Application ...

The Camrose Aquatic Centre, owned and operated by the City of Camrose, houses a 25-metre long, six-lane wide swimming pool with an adjacent diving tank, teardrop-shaped wading pool and whirlpool. The facility also has public locker rooms, changing rooms, a recreation office and staff area. Built in 1979, it occupies 28 000 square feet (2600 square metres) of floor area.

In 1983, Alberta's Energy Bus visited the aquatic centre to assess its energy use and the potential for energy cost savings. The audit team recommended that a pool cover be used to reduce the evaporative heat losses from the pool to save significant energy dollars.

In August 1983, aquatic manager, Skip Hayden, purchased a dual coat (polyethylene and foam) pool cover for about $1.00 per square foot ($11.00 per square metre). The cover with an "in-house" built motorized roller system was installed in October 1983 at a cost of $8589.

Each night, two staff members require about 15 minutes to place the cover on the pool using the power roller system. In the morning, only one staff member is needed to remove the cover in the same length of time.

The aquatic centre's natural gas bill was lowered by $4781 in the first year of pool cover use. Hayden estimates that during 1984, the pool water use dropped to about 390 gallons (1800 litres) per day from 520 gallons (2400 litres) — a 25 per cent savings in water use.

During the first year of pool cover use, operational costs (staff hours, electrical roller motor and maintenance costs) were $1321, resulting in a net savings of $3460 ($4781 – $1321). The City of Camrose calculated the payback period on their investment in the pool cover and power roller system as follows: capital costs divided by net savings = $8589/$3460 = 2.48 years.

Hayden has noticed significant energy savings since the cover was installed. He predicts that the reduction of the humidity level in the pool area will significantly decrease the repair and maintenance costs of the building and its mechanical systems.

"Swimming pools are the most expensive recreation facility to operate. Installing a pool cover on our pool has proven to be a valuable experiment in reducing energy costs. The cover is certainly worthwhile and has resulted in a significant saving in energy consumption, not only to us, but to the taxpayer as well," said Hayden.

The Bottom Line ...

The easiest method of determining the economic merits of installing a cover on a swimming pool is by calculating the payback period on the investment. A payback period of two years or less is usually considered economically attractive.

The accompanying graph illustrates the annual potential savings per square foot of outdoor pool surface area, for a range of hours that a pool may be covered. The savings are based on an average pool water temperature of 80°F (27°C) and on information from Alberta's Energy Bus audit database. These savings do not include the savings on water, sewer and chemical costs.

To determine the simple payback of pool cover installation, you need to know four things: the natural gas rate (dollars per gigajoule), the amount of time the pool will be covered, the cost per square foot of the pool cover and the pool surface area.

EXAMPLE

Natural gas rate:	$2.50 per gigajoule
Period of time covered	12 hours per day
Cover cost	$0.75 per square foot ($8.00 per square metre)
Pool surface area	2400 square feet (220 square metres)

Following this example, as outlined on the graph, a cost savings of $0.80 per year per square foot ($8.60 per square metre) of pool surface area can be identified. The simple return on investment would be the cost of the pool cover divided by the total annual savings.

From the example, the return on investment (cover only) would be:

Cover Cost	2400 sq. ft. × $0.75/sq. ft.	=	$1800
Annual Savings	2400 sq. ft. × $0.80/sq. ft.	=	$1920

$$\frac{\$1800 \quad \text{cost}}{\$1920 \quad \text{savings}} = 0.94 \text{ year}$$

You may want to include the cost of the roller system in the payback calculation. Simply add the cost of the roller system to the cost of the cover.

For example, if the roller system cost $1000, the return on investment (cover and roller) would be:

$$\frac{\$1800 + \$1000 \quad \text{total cost}}{\$1920 \quad \text{savings}} = 1.5 \text{ years}$$

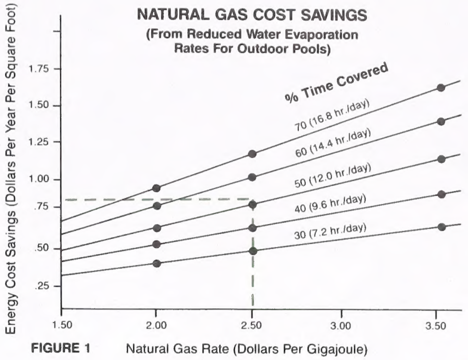


FIGURE 1

The above calculations and associated graph are based on information gathered for outdoor pools.

For indoor pools, additional savings are possible because covering a pool reduces the ventilation needed to control humidity. For pools covered 50 per cent of the time, the ventilation savings (for average ventilation rates) would be about $1600 per year (semi-public pools) and $4000 per year (public pools). When ventilation savings are included in the payback calculations, the return on investment is substantially improved.

SECTOR REVIEW

Savings Potential for Swimming Pools

Energy used by swimming pools varies widely depending on the type of facility, such as public or semi-public, and the hours of operation. The extent of variation in energy use has become evident following Energy Bus audits of almost every type of pool operation in Alberta.

An energy audit initially determines how energy is being used and how much it costs in each area. Energy conservation measures which may result in energy cost savings are then identified. On average, the Energy Bus has identified a potential reduction in energy costs of about 20 per cent.

Energy audits of 20 public swimming pool facilities and 22 semi-public facilities have identified good potential for lowering energy costs within the swimming pool sector. The energy audits indicate that pool operators have the potential to save from $24 000 (outdoor) to $28 000 (indoor) for semi-public facilities, and from $5000 (outdoor) to $11 000 (indoor) for public facilities annually.

These savings represent at least 18 per cent of the total energy costs for the audited facilities. Annual energy bills for public swimming pools ranged from $8000 to $175 000, with the average yearly cost being $18 000 (outdoor) and $47 000 (indoor). The energy costs for semi-public pools cannot be summarized, as such facilities are normally part of other operations such as hotels, motels or apartment complexes.

Figure 2 shows the relative percentage of natural gas and electrical energy use and costs for indoor and outdoor public pools. Natural gas use represents 83 per cent for indoor pools and 91 per cent for outdoor pools of the total energy used, but 51 per cent and 65 per cent, respectively, of the energy dollars spent.

The difference in the percentage of energy used and its cost is because the average price of a unit of electrical energy used in the swimming pool sector is about five times that of an equivalent unit of natural gas.

Figure 3 shows areas of energy use (electricity and natural gas) for public indoor and outdoor pools. Pool covers can generate savings in a number of energy use areas including water heating (natural gas), ventilation (natural gas and electricity) and pool equipment (electricity).

Alberta Energy Bus audits have identified average potential savings of $2400 per year (29 per cent) for hot water costs for indoor pools and $1700 per year (33 per cent) for hot water costs for outdoor pools. Potential natural gas savings of $4500 per year (56 per cent) for ventilation costs were also identified for indoor pools. Most of these ventilation savings would be associated with the use of a pool cover. These annual savings are represented in Figure 4.

The savings identified for indoor pools have a higher dollar figure ($2400) but a lower percentage figure (29 per cent) for overall cost and energy use due to the longer operating period for most indoor facilities.

Figure 5 indicates the overall potential for natural gas savings for indoor and outdoor pools through the use of a pool cover during non-use periods.

While there are many factors to consider before installing a cover on a swimming pool, the potential for big savings can make this a cost-effective energy conservation measure for recreational and commercial facilities in Alberta.

FIGURE 2

ENERGY USE Public Swimming Pools

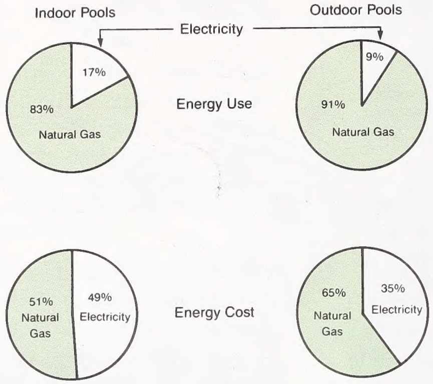
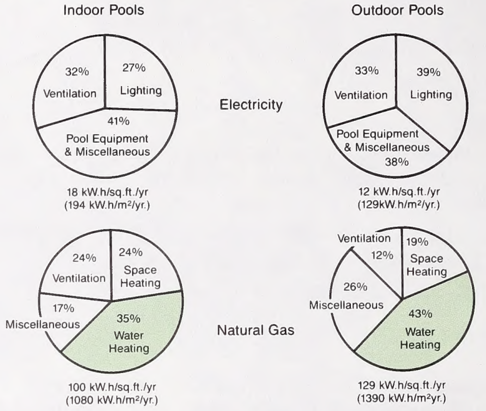


FIGURE 3 **ENERGY USE ANALYSIS**
(for Public Swimming Pools)



kW.h/sq.ft./yr = KiloWatt hour per Square Foot per Year

FIGURE 4 **POTENTIAL NATURAL GAS SAVINGS IN WATER HEATING AND VENTILATION**
(through the use of Pool Covers)

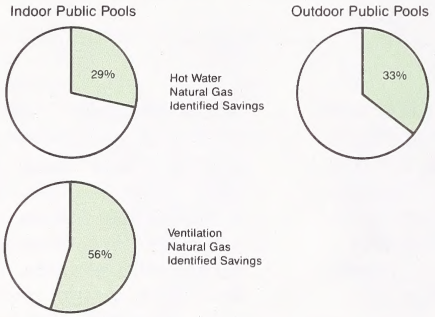
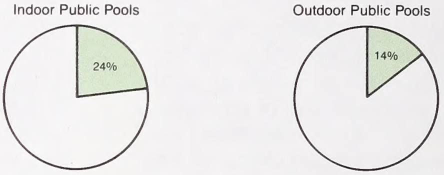


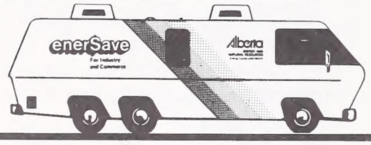
FIGURE 5

TOTAL NATURAL GAS SAVINGS POTENTIAL
(through the use of pool covers relative to the total pool facility natural gas use)



FOR MORE INFORMATION

The article Contain Your Energy Costs By Installing A Pool Cover was researched by Doug Brough, and the Sector Review was completed by Les Sladen. For more detailed information on energy cost savings calculations and the energy audit database, contact the industrial section of the Energy Conservation Branch: Phone 427-5200 (collect).



ENERGY $AVER$

Energy $aver$ is a series of fact sheets about energy conservation measures that have wide application in Alberta. Each issue highlights a different technology and its successful use in the province. The Sector Review summarizes energy use patterns of different facilities that have used Alberta's Energy Bus audit service. Comments, questions, and suggestions are welcome.

Write or phone (collect) to be placed on the mailing list. You may also receive back issues or arrange for an Energy Bus audit (conducted at no charge).

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Pub. No. I/249 1989
ISBN 0-86499-5660

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